DOCUMENTATION PAGE

Form Approved
OPM No. 0704-0188

AD-A226 799

1 ORT DATE

3. REPORT TYPE AND DATES COVERED
Final 13 Feb. 1990 to 13 Feb. 1991

4. TITLE AND SUBTITLE Ada Compiler Validation Summary Report: TLD Systems Ltd., TLD MV/MV Ada Compiler System, Version 2.1.3, Data Genral MV/32 2000-2 (Host & Target), 900213W1.10249

5. FUNDING NUMBERS

6. AUTHOR(S)
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8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Ada Joint Program Office
United States Department of Defense
Washington, D.C. 20301-3081

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

TLD Systems, Ltd., TLD MV/MV Ada Compiler System, Version 2.1.3, Wright-Patterson AFB, Data General MV/32 2000-2 under AOS/VS, Version 7.65 (Host & Target), ACVC 1.10.

14. SUBJECT TERMS Ada programming language, Ada Compiler Validation Summary Report, Ada Compiler Validation Capability, Validation Testing, Ada Validation Office, Ada Validation Facility, ANSI/MIL-STD-1815A, Ada Joint Program Office

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	

AVF Control Number: AVF-VSR-361.0790
89-09-21-TLD

Ada COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 900213W1.10249
TLD Systems, Ltd.
TLD MV/MV Ada Compiler System, Version 2.1.3
Data General MV/32 20000-2

Completion of On-Site Testing:
13 February 1990

Prepared By:
Ada Validation Facility
ASD/SCEL
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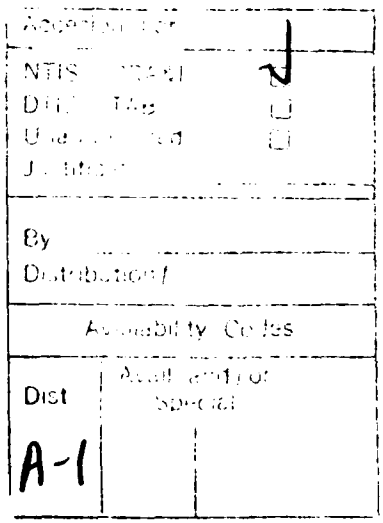

Prepared For:
Ada Joint Program Office
United States Department of Defense
Washington DC 20301-3081

Ada Compiler Validation Summary Report:

Compiler Name: TLD MV/MV Ada Compiler System, Version 2.1.3

Certificate Number: 900213I1.10249

Host: Data General MV/32 20000-2 under
AOS/VS, Version 7.65

Target: Data General MV/32 20000-2 under
AOS/VS, Version 7.65

Testing Completed 13 February 1990 Using ACVC 1.10

Customer Agreement Number: 89-09-21-TLD

This report has been reviewed and is approved.

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

This Validation Summary Report (VSR) describes the extent to which a specific Ada compiler conforms to the Ada Standard, ANSI/MIL-STD-1815A. This report explains all technical terms used within it and thoroughly reports the results of testing this compiler using the Ada Compiler Validation Capability (ACVC). An Ada compiler must be implemented according to the Ada Standard, and any implementation-dependent features must conform to the requirements of the Ada Standard. The Ada Standard must be implemented in its entirety, and nothing can be implemented that is not in the Standard.

Even though all validated Ada compilers conform to the Ada Standard, it must be understood that some differences do exist between implementations. The Ada Standard permits some implementation dependencies--for example, the maximum length of identifiers or the maximum values of integer types. Other differences between compilers result from the characteristics of particular operating systems, hardware, or implementation strategies. All the dependencies observed during the process of testing this compiler are given in this report.

The information in this report is derived from the test results produced during validation testing. The validation process includes submitting a suite of standardized tests, the ACVC, as inputs to an Ada compiler and evaluating the results. The purpose of validating is to ensure conformity of the compiler to the Ada Standard by testing that the compiler properly implements legal language constructs and that it identifies and rejects illegal language constructs. The testing also identifies behavior that is implementation-dependent but is permitted by the Ada Standard. Six classes of tests are used. These tests are designed to perform checks at compile time, at link time, and during execution.

1.1 PURPOSE OF THIS VALIDATION SUMMARY REPORT

This VSR documents the results of the validation testing performed on an Ada compiler. Testing was carried out for the following purposes:

- To attempt to identify any language constructs supported by the compiler that do not conform to the Ada Standard
- To attempt to identify any language constructs not supported by the compiler but required by the Ada Standard
- To determine that the implementation-dependent behavior is allowed by the Ada Standard

Testing of this compiler was conducted by SofTech, Inc. under the direction of the AVF according to procedures established by the Ada Joint Program Office and administered by the Ada Validation Organization (AVO). On-site testing was completed 13 February 1990 at Torrance CA.

1.2 USE OF THIS VALIDATION SUMMARY REPORT

Consistent with the national laws of the originating country, the AVO may make full and free public disclosure of this report. In the United States, this is provided in accordance with the "Freedom of Information Act" (5 U.S.C.#552). The results of this validation apply only to the computers, operating systems, and compiler versions identified in this report.

The organizations represented on the signature page of this report do not represent or warrant that all statements set forth in this report are accurate and complete, or that the subject compiler has no nonconformities to the Ada Standard other than those presented. Copies of this report are available to the public from:

Ada Information Clearinghouse
Ada Joint Program Office
OUSDRE
The Pentagon, Rm 3D-139 (Fern Street)
Washington DC 20301-3081

or from:

Ada Validation Facility
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Questions regarding this report or the validation test results should be directed to the AVF listed above or to:

Ada Validation Organization
Institute for Defense Analyses
1801 North Beauregard Street
Alexandria VA 22311

1.3 REFERENCES

1. Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.

2. Ada Compiler Validation Procedures, Version 2.0, Ada Joint Program Office, May 1989.

3. Ada Compiler Validation Capability Implementers' Guide, SofTech, Inc., December 1986.

4. Ada Compiler Validation Capability User's Guide, December 1986.

1.4 DEFINITION OF TERMS

ACVC	The Ada Compiler Validation Capability. The set of Ada programs that tests the conformity of an Ada compiler to the Ada programming language.
Ada Commentary	An Ada Commentary contains all information relevant to the point addressed by a comment on the Ada Standard. These comments are given a unique identification number having the form AI-ddddd.
Ada Standard	ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.
Applicant	The agency requesting validation.
AVF	The Ada Validation Facility. The AVF is responsible for conducting compiler validations according to procedures contained in the Ada Compiler Validation Procedures.
AVO	The Ada Validation Organization. The AVO has oversight authority over all AVF practices for the purpose of maintaining a uniform process for validation of Ada compilers. The AVO provides administrative and technical support for Ada validations to ensure consistent practices.
Compiler	A processor for the Ada language. In the context of this report, a compiler is any language processor, including cross-compilers, translators, and interpreters.

Failed test	An ACVC test for which the compiler generates a result that demonstrates nonconformity to the Ada Standard.
Host	The computer on which the compiler resides.
Inapplicable test	An ACVC test that uses features of the language that a compiler is not required to support or may legitimately support in a way other than the one expected by the test.
Passed test	An ACVC test for which a compiler generates the expected result.
Target	The computer for which a compiler generates code.
Test	A program that checks a compiler's conformity regarding a particular feature or a combination of features to the Ada Standard. In the context of this report, the term is used to designate a single test, which may comprise one or more files.
Withdrawn test	An ACVC test found to be incorrect and not used to check conformity to the Ada Standard. A test may be incorrect because it has an invalid test objective, fails to meet its test objective, or contains illegal or erroneous use of the language.

1.5 ACVC TEST CLASSES

Conformity to the Ada Standard is measured using the ACVC. The ACVC contains both legal and illegal Ada programs structured into six test classes: A, B, C, D, E, and L. The first letter of a test name identifies the class to which it belongs. Class A, C, D, and E tests are executable, and special program units are used to report their results during execution. Class B tests are expected to produce compilation errors. Class L tests are expected to produce compilation or link errors because of the way in which a program library is used at link time.

Class A tests ensure the successful compilation of legal Ada programs with certain language constructs which cannot be verified at compile time. There are no explicit program components in a Class A test to check semantics. For example, a Class A test checks that reserved words of another language (other than those already reserved in the Ada language) are not treated as reserved words by an Ada compiler. A Class A test is passed if no errors are detected at compile time and the program executes to produce a PASSED message.

Class B tests check that a compiler detects illegal language usage. Class B tests are not executable. Each test in this class is compiled and the resulting compilation listing is examined to verify that every syntax or semantic error in the test is detected. A Class B test is passed if every illegal construct that it contains is detected by the compiler.

Class C tests check the run time system to ensure that legal Ada programs can be correctly compiled and executed. Each Class C test is self-checking and produces a PASSED, FAILED, or NOT APPLICABLE message indicating the result when it is executed.

Class D tests check the compilation and execution capacities of a compiler. Since there are no capacity requirements placed on a compiler by the Ada Standard for some parameters--for example, the number of identifiers permitted in a compilation or the number of units in a library--a compiler may refuse to compile a Class D test and still be a conforming compiler. Therefore, if a Class D test fails to compile because the capacity of the compiler is exceeded, the test is classified as inapplicable. If a Class D test compiles successfully, it is self-checking and produces a PASSED or FAILED message during execution.

Class E tests are expected to execute successfully and check implementation-dependent options and resolutions of ambiguities in the Ada Standard. Each Class E test is self-checking and produces a NOT APPLICABLE, PASSED, or FAILED message when it is compiled and executed. However, the Ada Standard permits an implementation to reject programs containing some features addressed by Class E tests during compilation. Therefore, a Class E test is passed by a compiler if it is compiled successfully and executes to produce a PASSED message, or if it is rejected by the compiler for an allowable reason.

Class L tests check that incomplete or illegal Ada programs involving multiple, separately compiled units are detected and not allowed to execute. Class L tests are compiled separately and execution is attempted. A Class L test passes if it is rejected at link time--that is, an attempt to execute the main program must generate an error message before any declarations in the main program or any units referenced by the main program are elaborated. In some cases, an implementation may legitimately detect errors during compilation of the test.

Two library units, the package REPORT and the procedure CHECK_FILE, support the self-checking features of the executable tests. The package REPORT provides the mechanism by which executable tests report PASSED, FAILED, or NOT APPLICABLE results. It also provides a set of identity functions used to defeat some compiler optimizations allowed by the Ada Standard that would circumvent a test objective. The procedure CHECK_FILE is used to check the contents of text files written by some of the Class C tests for chapter 14 of the Ada Standard. The operation of REPORT and CHECK_FILE is checked by a set of executable tests. These tests produce messages that are examined to verify that the units are operating correctly. If these units are not operating correctly, then the validation is not attempted.

The text of each test in the ACVC follows conventions that are intended to ensure that the tests are reasonably portable without modification. For example, the tests make use of only the basic set of 55 characters, contain lines with a maximum length of 72 characters, use small numeric values, and place features that may not be supported by all implementations in separate tests. However, some tests contain values that require the test to be

customized according to implementation-specific values--for example, an illegal file name. A list of the values used for this validation is provided in Appendix C.

A compiler must correctly process each of the tests in the suite and demonstrate conformity to the Ada Standard by either meeting the pass criteria given for the test or by showing that the test is inapplicable to the implementation. The applicability of a test to an implementation is considered each time the implementation is validated. A test that is inapplicable for one validation is not necessarily inapplicable for a subsequent validation. Any test that was determined to contain an illegal language construct or an erroneous language construct is withdrawn from the ACVC and, therefore, is not used in testing a compiler. The tests withdrawn at the time of this validation are given in Appendix D.

CHAPTER 2

CONFIGURATION INFORMATION

2.1 CONFIGURATION TESTED

The candidate compilation system for this validation was tested under the following configuration:

Compiler: TLD MV/MV Ada Compiler System, Version 2.1.3

ACVC Version: 1.10

Certificate Number: 900213W1.10249

Host Computer:

Machine:	Data General MV/32 20000-2
Operating System:	AOS/VS Version 7.65
Memory Size:	48 Megabytes

Target Computer:

Machine:	Data General MV/32 20000-2
Operating System:	AOS/VS Version 7.65
Memory Size:	48 Megabytes

2.2 IMPLEMENTATION CHARACTERISTICS

One of the purposes of validating compilers is to determine the behavior of a compiler in those areas of the Ada Standard that permit implementations to differ. Class D and E tests specifically check for such implementation differences. However, tests in other classes also characterize an implementation. The tests demonstrate the following characteristics:

a. Capacities.

(1) The compiler correctly processes a compilation containing 723 variables in the same declarative part. (See test D29002K.)

(2) The compiler correctly processes tests containing loop statements nested to 65 levels. (See tests D55A03A..H (8 tests).)

(3) The compiler correctly processes tests containing block statements nested to 65 levels. (See test D56001B.)

(4) The compiler correctly processes tests containing recursive procedures separately compiled as subunits nested to six levels. (See tests D64005E..G (3 tests).)

b. Predefined types.

(1) This implementation supports the additional predefined types SHORT_INTEGER and LONG_FLOAT in package STANDARD. (See tests B86001T..Z (7 tests).)

c. Expression evaluation.

The order in which expressions are evaluated and the time at which constraints are checked are not defined by the language. While the ACVC tests do not specifically attempt to determine the order of evaluation of expressions, test results indicate the following:

(1) Some of the default initialization expressions for record components are evaluated before any value is checked for membership in a component's subtype. (See test C32117A.)

(2) Assignments for subtypes are performed with less precision than the base type. (See test C35712B.)

(3) This implementation uses no extra bits for extra precision and uses all extra bits for extra range. (See test C35903A.)

(4) Sometimes NUMERIC_ERROR is raised when an integer literal operand in a comparison or membership test is outside the range of the base type. (See test C45232A.)

(5) No exception is raised when a literal operand in a fixed-point comparison or membership test is outside the range of the base type. (See test C45252A.)

(6) Underflow is gradual. (See tests C45524A..Z (26 tests).)

d. Rounding.

The method by which values are rounded in type conversions is not defined by the language. While the ACVC tests do not specifically attempt to determine the method of rounding, the test results indicate the following:

(1) The method used for rounding to integer is round away from zero. (See tests C46012A..Z (26 tests).)

(2) The method used for rounding to longest integer is round away from zero. (See tests C46012A..Z (26 tests).)

(3) The method used for rounding to integer in static universal real expressions is round away from zero. (See test C4A014A.)

e. Array types.

An implementation is allowed to raise NUMERIC_ERROR or CONSTRAINT_ERROR for an array having a 'LENGTH that exceeds STANDARD.INTEGER'LAST and/or SYSTEM.MAX_INT.

For this implementation:

(1) Declaration of an array type or subtype declaration with more than SYSTEM.MAX_INT components raises NUMERIC_ERROR sometimes. (See test C36003A.)

(2) CONSTRAINT_ERROR is raised when 'LENGTH is applied to an array type with INTEGER'LAST + 2 components with each component being a null array. (See test C36202A.)

(3) CONSTRAINT_ERROR is raised when 'LENGTH is applied to an array type with SYSTEM.MAX_INT + 2 components with each component being a null array. (See test C36202B.)

(4) A packed BOOLEAN array having a 'LENGTH exceeding INTEGER'LAST raises CONSTRAINT_ERROR when the array objects are declared. (See test C52103X.)

(5) A packed two-dimensional BOOLEAN array with more than INTEGER'LAST components raises CONSTRAINT_ERROR when the array objects are declared. (See test C52104Y.)

(6) A null array with one dimension of length greater than INTEGER'LAST may raise NUMERIC_ERROR or CONSTRAINT_ERROR either when declared or assigned. Alternatively, an implementation may accept the declaration. However, lengths must match in array slice assignments. This implementation raises no exception. (See test E52103Y.)

(7) In assigning one-dimensional array types, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

(8) In assigning two-dimensional array types, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

f. Discriminated types.

(1) In assigning record types with discriminants, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

g. Aggregates.

(1) In the evaluation of a multi-dimensional aggregate, index subtype checks are made as choices are evaluated. (See tests C43207A and C43207B.)

(2) In the evaluation of an aggregate containing subaggregates, not all choices are evaluated before being checked for identical bounds. (See test E43212B.)

(3) CONSTRAINT_ERROR is raised before all choices are evaluated when a bound in a non-null range of a non-null aggregate does not belong to an index subtype. (See test E43211B.)

h. Pragmas.

(1) The pragma INLINE is not supported for functions or procedures. (See tests LA3004A..B (2 tests), EA3004C..D (2 tests), and CA3004E..F (2 tests).)

i. Generics.

(1) Generic specifications and bodies can be compiled in separate compilations. (See tests CA1012A, CA2009C, CA2009F, BC3204C, and BC3205D.)

(2) Generic unit bodies and their subunits can be compiled in separate compilations. (See test CA3011A.)

j. Input and output.

(1) The package SEQUENTIAL_IO cannot be instantiated with unconstrained array types or record types with discriminants without defaults. (See tests AE2101C, EE2201D, and EE2201E.)

(2) The package DIRECT_IO cannot be instantiated with unconstrained array types or record types with discriminants without defaults. (See tests AE2101H, EE2401D, and EE2401G.)

(3) Modes IN_FILE and OUT_FILE are supported for SEQUENTIAL_IO. (See tests CE2102D..E (2 tests), CE2102N, and CE2102P.)

(4) Modes IN_FILE, OUT_FILE, and INOUT_FILE are supported for DIRECT_IO. (See tests CE2102F, CE2102I..J (2 tests), CE2102R, CE2102T, and CE2102V.)

(5) Modes IN_FILE and OUT_FILE are supported for text files. (See tests CE3102E and CE3102I..K (3 tests).)

(6) RESET and DELETE operations are supported for SEQUENTIAL_IO. (See tests CE2102G and CE2102X.)

(7) RESET and DELETE operations are supported for DIRECT_IO. (See tests CE2102K and CE2102Y.)

(8) RESET and DELETE operations are supported for text files. (See tests CE3102F..G (2 tests), CE3104C, CE3110A, and CE3114A.)

(9) Overwriting to a sequential file truncates to the last element written. (See test CE2208B.)

(10) Temporary sequential files are given names and deleted when closed. (See test CE2108A.)

(11) Temporary direct files are given names and deleted when closed. (See test CE2108C.)

(12) Temporary text files are given names and deleted when closed. (See test CE3112A.)

(13) More than one internal file can be associated with each external file for sequential files when reading only. (See tests CE2107A..E (5 tests), CE2102L, CE2110B, and CE2111D.)

(14) More than one internal file can be associated with each external file for direct files when reading only. (See tests CE2107F..H (3 tests), CE2110D, and CE2111H.)

(15) More than one internal file can be associated with each external file for text files when reading only. (See tests CE3111A..E (5 tests), CE3114B, and CE3115A.)

CHAPTER 3

TEST INFORMATION

3.1 TEST RESULTS

Version 1.10 of the ACVC comprises 3717 tests. When this compiler was tested, 44 tests had been withdrawn because of test errors. The AVF determined that 504 tests were inapplicable to this implementation. All inapplicable tests were processed during validation testing except for 201 executable tests that use floating-point precision exceeding that supported by the implementation. Modifications to the code, processing, or grading for 7 tests were required to successfully demonstrate the test objective.

The AVF concludes that the testing results demonstrate acceptable conformity to the Ada Standard.

3.2 SUMMARY OF TEST RESULTS BY CLASS

RESULT	TEST CLASS						TOTAL
	A	B	C	D	E	L	
Passed	125	1131	1836	15	18	44	3169
Inapplicable	4	7	479	2	10	2	504
Withdrawn	1	2	35	0	6	0	44
TOTAL	130	1140	2350	17	34	46	3717

3.3 SUMMARY OF TEST RESULTS BY CHAPTER

RESULT	CHAPTER													TOTAL
	2	3	4	5	6	7	8	9	10	11	12	13	14	
Passed	194	575	544	245	170	99	158	332	131	36	252	155	278	3169
Inappl	18	74	136	3	2	0	8	0	6	0	0	214	43	504
Wdrn	1	1	0	0	0	0	0	2	0	0	1	35	4	44
TOTAL	213	650	680	248	172	99	166	334	137	36	253	404	325	3717

3.4 WITHDRAWN TESTS

The following 44 tests were withdrawn from ACVC Version 1.10 at the time of this validation:

E28005C	A39005G	B97102E	C97116A	BC3009B	CD2A62D
CD2A63A	CD2A63B	CD2A63C	CD2A63D	CD2A66A	CD2A66B
CD2A66C	CD2A66D	CD2A73A	CD2A73B	CD2A73C	CD2A73D
CD2A76A	CD2A76B	CD2A76C	CD2A76D	CD2A81G	CD2A83G
CD2A84M	CD2A84N	CD2B15C	CD2D11B	CD5007B	CD50110
ED7004B	ED7005C	ED7005D	ED7006C	ED7006D	CD7105A
CD7203B	CD7204B	CD7205C	CD7205D	CE2107I	CE3111C
CE3301A	CE3411B				

See Appendix D for the reason that each of these tests was withdrawn.

3.5 INAPPLICABLE TESTS

Some tests do not apply to all compilers because they make use of features that a compiler is not required by the Ada Standard to support. Others may depend on the result of another test that is either inapplicable or withdrawn. The applicability of a test to an implementation is considered each time a validation is attempted. A test that is inapplicable for one validation attempt is not necessarily inapplicable for a subsequent attempt. For this validation attempt, 504 tests were inapplicable for the reasons indicated:

a. C24113H..K (4 tests) are nct applicable because the line length exceeds the maximum input line length permitted by this implementation.

b. The following 201 tests are not applicable because they have floating-point type declarations requiring more digits than SYSTEM.MAX_DIGITS:

C24113L..Y (14 tests)	C35705L..Y (14 tests)
C35706L..Y (14 tests)	C35707L..Y (14 tests)
C35708L..Y (14 tests)	C35802L..Z (15 tests)
C45241L..Y (14 tests)	C45321L..Y (14 tests)
C45421L..Y (14 tests)	C45521L..Z (15 tests)
C45524L..Z (15 tests)	C45621L..Z (15 tests)
C45641L..Y (14 tests)	C46012L..Z (15 tests)

c. C35702A and B86001T are not applicable because this implementation supports no predefined type SHORT_FLOAT.

d. The following 172 tests are not applicable because this implementation does not support 'SMALL clauses or 'SIZE length clauses for other than task types:

A39005B	A39005E	C87B62A	C87B62C
CD1009A..I (9)	CD1009L	CD10090..Q (3)	CD1C03A
CD1C03F	CD1C04A	CD1C04C	CD2A21A..E (5)
CD2A22A..J (10)	CD2A23A..E (5)	CD2A24A..J (10)	ED2A26A
CD2A31A..D (4)	CD2A32A..J (10)	CD2A41A..E (5)	CD2A42A..J (10)
CD2A51A..E (5)	CD2A52A..D (4)	CD2A52G..J (4)	CD2A53A..E (5)
CD2A54A..D (4)	CD2A54G..J (4)	ED2A56A	CD2A61A..L (12)
CD2A62A..C (3)	CD2A64A..D (4)	CD2A65A..D (4)	CD2A71A..D (4)
CD2A72A..D (4)	CD2A74A..D (4)	CD2A75A..D (4)	CD2A81A..F (6)
CD2A83A..C (3)	CD2A83E..F (2)	CD2A84B..I (8)	CD2A84K..L (2)
ED2A86A	CD2A87A	CD2D11A	CD2D13A

e. The following 16 tests are not applicable because this implementation does not support a predefined type LONG_INTEGER:

C45231C	C45304C	C45502C	C45503C	C45504C
C45504F	C45611C	C45613C	C45614C	C45631C
C45632C	B52004D	C55B07A	B55B09C	B86001W
CD7101F				

f. C45231D, B86001X, and CD7101G are not applicable because this implementation does not support any predefined integer type with a name other than INTEGER, LONG_INTEGER, or SHORT_INTEGER.

g. C45531M..P (4 tests) and C45532M..P (4 tests) are not applicable because the value of SYSTEM.MAX_MANTISSA is less than 48.

h. D64005F and D64005G are not applicable because this implementation does not support nesting 10 levels of recursive procedure calls.

i. C86001F is not applicable because, for this implementation, the package TEXT_IO is dependent upon package SYSTEM. This test recompiles package SYSTEM, making package TEXT_IO, and hence package REPORT, obsolete.

j. B86001Y is not applicable because this implementation supports no predefined fixed-point type other than DURATION.

k. B86001Z is not applicable because this implementation supports no predefined floating-point type with a name other than FLOAT, LONG_FLOAT, or SHORT_FLOAT.

l. LA3004A, LA3004B, EA3004C, EA3004D, CA3004E, and CA3004F are not applicable because this implementation does not support pragma INLINE.

m. The following 14 tests are not applicable because this implementation does not support record representation clauses:

CD1009N	CD1009X..Z (3)	CD1C03H	CD1C04E
ED1D04A	CD4031A	CD4041A	CD4051A..D (4)
CD7204C			

n. CD2B15B is not applicable to this implementation because the space that was reserved for the collection exceeded the specified size.

o. The following 29 tests are not applicable because this implementation does not support address clauses for constants:

CD5011B	CD5011D	CD5011F	CD5011H	CD5011L
CD5011N	CD5011R	CD5012C	CD5012D	CD5012G
CD5012H	CD5012L	CD5013B	CD5013D	CD5013F
CD5013H	CD5013L	CD5013N	CD5013R	CD5014B
CD5014D	CD5014F	CD5014H	CD5014J	CD5014L
CD5014N	CD5014R	CD5014U	CD5014W	

p. AE2101C and EE2201D..E (2 tests) use instantiations of package SEQUENTIAL_IO with unconstrained array types and record types with discriminants without defaults. These instantiations are rejected by this compiler.

q. AE2101H, EE2401D, and EE2401G use instantiations of package DIRECT_IO with unconstrained array types and record types with discriminants without defaults. These instantiations are rejected by this compiler.

r. CE2102D is inapplicable because this implementation supports CREATE with IN_FILE mode for SEQUENTIAL_IO.

s. CE2102E is inapplicable because this implementation supports CREATE with OUT_FILE mode for SEQUENTIAL_IO.

t. CE2102F is inapplicable because this implementation supports CREATE with INOUT_FILE mode for DIRECT_IO.

u. CE2102I is inapplicable because this implementation supports CREATE with IN_FILE mode for DIRECT_IO.

v. CE2102J is inapplicable because this implementation supports CREATE with OUT_FILE mode for DIRECT_IO.

w. CE2102N is inapplicable because this implementation supports OPEN with IN_FILE mode for SEQUENTIAL_IO.

x. CE2102O is inapplicable because this implementation supports RESET with IN_FILE mode for SEQUENTIAL_IO.

y. CE2102P is inapplicable because this implementation supports OPEN with OUT_FILE mode for SEQUENTIAL_IO.

z. CE2102Q is inapplicable because this implementation supports RESET with OUT_FILE mode for SEQUENTIAL_IO.

aa. CE2102R is inapplicable because this implementation supports OPEN with INOUT_FILE mode for DIRECT_IO.

ab. CE2102S is inapplicable because this implementation supports RESET with INOUT_FILE mode for DIRECT_IO.

ac. CE2102T is inapplicable because this implementation supports OPEN with IN_FILE mode for DIRECT_IO.

ad. CE2102U is inapplicable because this implementation supports RESET with IN_FILE mode for DIRECT_IO.

ae. CE2102V is inapplicable because this implementation supports OPEN with OUT_FILE mode for DIRECT_IO.

af. CE2102W is inapplicable because this implementation supports RESET with OUT_FILE mode for DIRECT_IO.

ag. CE2107B..E (4 tests), CE2107L, and CE2110B are not applicable because multiple internal files cannot be associated with the same external file when one or more files is writing for sequential files. The proper exception is raised when multiple access is attempted.

ah. CE2107G..H (2 tests), CE2110D, and CE2111H are not applicable because multiple internal files cannot be associated with the same external file when one or more files is writing for direct files. The proper exception is raised when multiple access is attempted.

ai. CE2111D is not applicable because this implementation does not support resetting an open file.

aj. CE3102E is inapplicable because this implementation supports CREATE with IN_FILE mode for text files.

ak. CE3102F is inapplicable because this implementation supports RESET for text files.

al. CE3102G is inapplicable because this implementation supports deletion of an external file for text files.

am. CE3102I is inapplicable because this implementation supports CREATE with OUT_FILE mode for text files.

an. CE3102J is inapplicable because this implementation supports OPEN with IN_FILE mode for text files.

ao. CE3102K is inapplicable because this implementation supports OPEN with OUT_FILE mode for text files.

ap. CE3111B, CE3111D..E (2 tests), CE3114B, and CE3115A are not applicable because multiple internal files cannot be associated with the same external file when one or more files is writing for text files. The proper exception is raised when multiple access is attempted.

3.6 TEST, PROCESSING, AND EVALUATION MODIFICATIONS

It is expected that some tests will require modifications of code, processing, or evaluation in order to compensate for legitimate implementation behavior. Modifications are made by the AVF in cases where legitimate implementation behavior prevents the successful completion of an (otherwise) applicable test. Examples of such modifications include: adding a length clause to alter the default size of a collection; splitting a Class B test into subtests so that all errors are detected; and confirming that messages produced by an executable test demonstrate conforming behavior that wasn't anticipated by the test (such as raising one exception instead of another).

Modifications were required for 7 tests.

The following tests were split because syntax errors at one point resulted in the compiler not detecting other errors in the test:

B24009A B44004D B49003A B49005A B49009C B59001E

At the recommendation of the AVO, the expression "2**T'MANTISSA - 1" on line 262 of test CC1223A was changed to "(2**(T'MANTISSA-1)-1 + 2**(T'MANTISSA-1))" since the previous expression causes an unexpected exception to be raised.

3.7 ADDITIONAL TESTING INFORMATION

3.7.1 Prevalidation

Prior to validation, a set of test results for ACVC Version 1.10 produced by the TLD MV/MV Ada Compiler System, Version 2.1.3 compiler was submitted to the AVF by the applicant for review. Analysis of these results demonstrated that the compiler successfully passed all applicable tests, and the compiler exhibited the expected behavior on all inapplicable tests.

3.7.2 Test Method

Testing of the TLD MV/MV Ada Compiler System, Version 2.1.3 compiler using ACVC Version 1.10 was conducted on-site by a validation team from the AVF. The configuration in which the testing was performed is described by the following designations of hardware and software components:

Host computer:	Data General MV/32 20000-2
Host operating system:	AOS/VS, Version 7.65
Target computer:	Data General MV/32 20000-2
Target operating system:	AOS/VS, Version 7.65
Compiler:	TLD MV/MV Ada Compiler System, Version 2.1.3

A magnetic tape containing all tests except for withdrawn tests and tests requiring unsupported floating-point precisions was taken on-site by the validation team for processing. Tests that make use of implementation-specific values were customized before being written to the magnetic tape. Tests requiring modifications during the prevalidation testing were included in their modified form on the magnetic tape.

The contents of the magnetic tape were not loaded directly onto the host computer. The files are initially loaded on the VAX, modified, and moved to the MV using Ethernet.

After the test files were loaded to disk, the full set of tests was compiled, linked, and all executable tests were run on the Data General MV/32 20000-2. Results were printed from the host computer.

The compiler was tested using command scripts provided by TLD Systems, Ltd. and reviewed by the validation team. The compiler was tested using all the following option settings. See Appendix E for a complete listing of the compiler options for this implementation. The following list of compiler options includes those options which were invoked by default:

No_checks = Exception Info	Suppress generation of Debug string's in unrelocatable object code for unhandled exception

TEST INFORMATION

No_Phase	Suppress display of phase times during compilation

Tests were compiled, linked, and executed (as appropriate) using a single computer. Test output, compilation listings, and job logs were captured on magnetic tape and archived at the AVF. The listings examined on-site by the validation team were also archived.

3.7.3 Test Site

Testing was conducted at Torrance CA and was completed on 13 February 1990.

APPENDIX A

DECLARATION OF CONFORMANCE

TLD Systems, Ltd. has submitted the following Declaration of Conformance concerning the TLD MV/MV Ada Compiler System, Version 2.1.3 compiler.

DECLARATION OF CONFORMANCE

Compiler Implementor: TLD Systems, Ltd.
Ada Validation Facility: ASD/SCOL, Wright-Patterson AFB, OH 45433-6503
Ada Compiler Validation Capability (ACVC) Version: 1.10

Base Configuration

Base Compiler Name: TLD MV/MV Ada Compiler System, Version 2.1.3

Host Architecture ISA: Data General MV/32 20000-2
OS&VER #: AOS/VS, Version 7.65
Target Architecture ISA: Data General MV/32 20000-2

OS&VER #: AOS/VS, Version 7.65

Implementor's Declaration

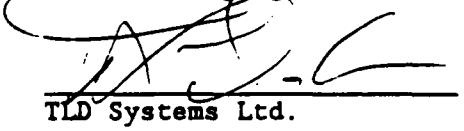
I, the undersigned, representing TLD Systems, Ltd., have implemented no deliberate extensions to the Ada Language Standard ANSI/MIL-STD-1815A in the compiler listed in this declaration operating in the default mode. I declare that TLD Systems, Ltd. is the owner of record of the Ada language compiler listed above and, as such, is responsible for maintaining said compiler in conformance to ANSI/MIL-STD-1815A. All certificates and registrations for the Ada language compiler listed in this declaration shall be made only in the owner's corporate name.

Date: 29 January 1990

TLD Systems, Ltd.
Terry L. Dunbar, President

Owner's Declaration

I, the undersigned, representing TLD Systems, Ltd., take full responsibility for implementation and maintenance of the Ada compiler listed above, and agree to the public disclosure of the final Validation Summary Report. I further agree to continue to comply with the Ada trademark policy, as defined by the Ada Joint Program Office. I declare that all of the Ada language compilers listed, and their host/target performance are in compliance with the Ada Language Standard ANSI/MIL-STD-1815A.



Date: 29 January 1990

TLD Systems Ltd.
Terry L. Dunbar, President

APPENDIX B

APPENDIX F OF THE Ada STANDARD

The only allowed implementation dependencies correspond to implementation-dependent pragmas, to certain machine-dependent conventions as mentioned in Chapter 13 of the Ada Standard, and to certain allowed restrictions on representation clauses. The implementation-dependent characteristics of the TLD MV/MV Ada Compiler System, Version 2.1.3 compiler, as described in this Appendix, are provided by TLD Systems, Ltd. Unless specifically noted otherwise, references in this Appendix are to compiler documentation and not to this report. Implementation-specific portions of the package STANDARD, which are not a part of Appendix F, are:

```
package STANDARD is

   ...

   type INTEGER is range -2147483648 .. 2147483647;
   type SHORT_INTEGER is range -32768 .. 32767;

   type FLOAT is digits 6 range -2.26156E+74 .. 2.26156E+74;
   type LONG_FLOAT is digits 15
        range -2.26156424291634E+74 .. 2.26156424291634E+74;

   type DURATION is delta 2.0**(-12) range -86400.0 .. 86400.0;

   ...

end STANDARD;
```

The Ada language definition allows for certain machine_dependencies in a controlled manner. No machine-dependent syntax of semantic extensions or restrictions are allowed. The only allowed implementation-dependencies correspond to implementaton-dependent pragmas and attributes, certain machine-dependent conventions as mentioned in chapter 13, and certain allowed restrictions on representation clauses.

The full definition of the implementation-dependent characteristics of the TLD MV/MV Ada Compiler System is presented in this Appendix F.

Implementation-Dependent Pragmas

The TLD ACS supports the following implementation dependent pragmas.

Pragma Export (Language_name, Ada_entity_name, (String));

This pragma is a complement to Pragma Interface and instructs the compiler to make the entity named available for reference by a foreign language module. The language name identifies the language in which the foreign module is coded. The only foreign language presently supported is Assembly. Ada and JOVIAL are permitted and presently mean the same as Assembly but the semantics of their use are subject to redefinition by future releases of the compiler. If the optional third parameter is present, the string provides the name by which the entity may be referenced by the foreign module. The contents of this string must conform to the conventions for the indicated foreign language and the linker being used. No check is made by the compiler to insure that these conventions are obeyed.

Only objects having static allocation and subprograms are supported by pragma Export. If the Ada entity named is a subprogram, this pragma must be placed within the declarative region of the named subprogram. If the name is that of an object, the pragma must be placed within the same declarative region and following the object declaration. It is the responsibility of the programmer to insure that the subprogram and object are elaborated before the reference is made.

```
pragma If (Compile_Time_Expression);
pragma Elsif (Compile_Time_Expression);
pragma Else;
pragma Endif;
```

These source directives may be used to enclose conditionally compiled source to enhance program portability and configuration adaptation. These directives may occur at the place that language defined pragmas, statements, or declarations may occur. Source code following these pragmas will be compiled or ignored similar to the semantics of the corresponding Ada statements depending upon whether the Compile_Time_Expression is true or false, respectively. The primary difference between these pragmas and the

corresponding Ada statements are that the pragmas may enclose declarations and other pragmas.

Implementation-Dependent Attributes

None.

Representation Clause Restrictions

Pragma Pack is not supported.

Length clauses are not supported for 'SIZE except when applied to task types.

Length clauses are not supported for 'Storage_Size when applied to access types.

Length clauses are supported for 'Storage_Size when applied to a task type and denote the number of words of stack to be allocated to the task.

Length clauses are not supported for 'Small.

Enumeration representation clauses are supported for value ranges of Integer'First to Integer'Last.

Record representation clauses are supported to arrange record components within a record. Record components may not be specified to cross a word boundary unless they are arranged to encompass two or more whole words. A record component of type record that has itself been "rep specificationed" may only be allocated at bit 0. Bits are numbered from left to right with bit 0 indicating the sign bit.

The alignment clause is not supported.

Address clauses are supported for variable objects and designate the virtual address of the object. The TLD Ada Compiler System treats the address specification as a means to access objects allocated by other than Ada means and accordingly does not treat the clause as a request to allocate the object at the indicated address.

Address clauses are not supported for constant objects, packages, tasks, or task entries.

Address Clause Expressions

Address expression values and type Address represent a location in logical memory (in the program's current address state). For objects, the address specifies a location within the logical address space. The 'Address attribute applied to a subprogram represents a 32 bit word address within the logical instruction space.

Unchecked Conversion Restrictions

None

I/O Package Characteristics

The following implementation-defined types are declared in Text_Io.

```
subtype Count is integer range 0 .. 2_147_483_647;

subtype Field is Integer range 0 .. 127;
```

Other System Dependencies

LRM Chapter 1.

None.

LRM Chapter 2.

Maximum source line length -- 120 characters.

Source line terminator -- Determined by the Editor used.

Maximum name length -- 120 characters.

External representation of name characters.

Maximum String literal -- 120 characters.

LRM Chapter 3.

LRM defined pragmas are recognized and processed as follows:

Controlled -- Has no effect.

Elaborate -- As described in the LRM.

Inline -- Not presently supported.

Interface -- Supported as a means of importing foreign language components into the Ada Program Library. May be applied either to a subprogram declaration as being specially implemented, -- read Interface as Import --, or to an object that has been declared elsewhere. Interface languages supported are Assembly for calling assembly language routines; and MV_32 for defining built in instruction procedures. An optional third parameter is used to define a name other than the name of the Ada subprogram for interfacing with the linker.

List -- As defined in the LRM.

Memory Size -- Has no effect.

Optimize -- Has no effect. Optimization controlled by compiler command option.

Pack -- Has no effect.

Page -- As defined in the LRM.

Priority -- As defined in the LRM. Priority may range from 1 to 200. Default priority is 1.

Shared -- As defined in the LRM. May be applied to scalar objects only.

Storage Unit -- Has no effect.

Suppress -- As defined in the LRM for suppressing checks; all standard checks may be suppressed individually as well as "Exception_Info" and "All_Checks". Suppression of Exception_Info eliminates data used to provide symbolic debug information in the event of an unhandled exception. The All_Checks selection eliminates all checks with a single pragma. In addition to the pragma, the compiler permits control of check suppression by command line option without the necessity of source changes.

System Name -- Has no effect.

Number declarations are not assigned addresses and their names are not permitted as a prefix to the 'address attribute. (Clarification only).

Objects are allocated by the compiler to occupy one or more 16 bit words. Only in the presence record representation clauses are objects allocated to less than a word.

Except for access objects, uninitialized objects contain an undefined value. An attempt to reference the value of an uninitialized object is not detected.

The maximum number of enumeration literals of all types is limited only by available symbol table space.

The predefined integer types are:

```
Short_Integer range -32_768 .. 32_767 and is implemented as a 16 bit
value.
Integer range -2_147_483_648 .. 2_147_483_647 and implemented a 32-bit
value.
Long_Integer is not supported.

System.Min_Int is -2_147_483_648.
System.Max_Int is 2_147_483_647.
```

The predefined real types are:

```
Float digits 6.
Long_Float digits 15.
Short_Float is not presently supported.

System.Max_Digits is 15 digits.
```

Fixed point is implemented as 16-bit or 32-bit data as is appropriate for the range and delta.

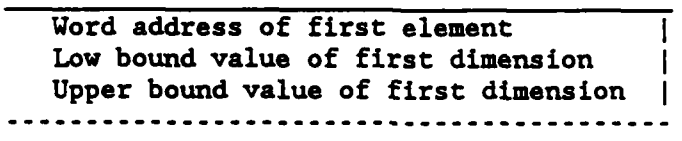
Index constraints as well as other address values such as access types are limited to 29 bits of value.

The maximum array size is limited to the size of virtual address.

The maximum String length is the same as for other arrays.

Access objects are implemented as an unsigned 32 bit integer. The access literal Null is implementated as two words of zero.

There is no limit on the number of dimensions of an array type. Array types are passed as parameters opposite unconstrained formal parameters using a 3 word dope vector illustrated below:



Additional dimension bounds follow immediately for arrays with more than one dimension.

LRM Chapter 4.

Machine_Overflows is True.

Pragma Controlled has no effect since garbage collection is never performed.

LRM Chapter 5.

The maximum number of statements in an Ada source program is undefined and limited only by Symbol Table space.

Case statements unless they are quite sparse, are allocated as indexed jump vectors and are, therefore, quite fast.

Loop statements with a for implementation scheme are implemented most efficiently if the range is in reverse and down to zero.

Data declared in block statements is elaborated as part of its containing scope.

LRM Chapter 6.

Arrays, records and task types are passed by reference.

Pragma Inline is not presently supported for subprograms.

LRM Chapter 7.

Package elaboration is performed dynamically permitting a warm restart without the necessity to reload the program.

LRM Chapter 8.

LRM Chapter 9.

Task objects are implemented as access types pointing to a Task Information Block (TIB).

Type Time in package Calendar is declared as a record containing two double precision integer values: the date in days and the real time clock.

Pragma Priority is supported with a value of 1 to 200.

Pragma Shared is supported for scalar objects.

LRM Chapter 10.

Multiple Ada Program Libraries are supported with each library containing an optional ancester library. The predefined packages are contained in the TLD standard library, MV.LIB.

LRM Chapter 11.

Exceptions are implemented by the TLD Ada Compiler System to take advantage of the normal policy in embedded computer system design to reserve 50% of the duty cycle. By executing a small number of instructions in the prologue of a procedure or block containing an exception handler, a branch may be taken, at the occurrence of an exception, directly to a handler rather than performing the time consuming code of unwinding procedure calls and stack frames. The philosophy taken is that an exception signals an exceptional condition, perhaps a serious one involving recovery or reconfiguration, and that quick response in this situation is more important and worth the small throughput tradeoff in a real time environment.

LRM Chapter 12.

A single generic instance is generated for a generic body. Generic specifications and bodies need not be compiled together nor need a body be compiled prior to the compilation of an instantiation. Because of the single expansion, this implementation of generics tend to be more favorable of space savings. To achieve this tradeoff, the instantiations must by nature be more general and are, therefore, somewhat less efficient timewise.

LRM Chapter 13.

Representation clause support and restrictions are defined above.

A comprehensive Machine_Code package is provided and supported.

Unchecked_Deallocation and Unchecked_Conversion are supported.

The implementation dependent attributes are all supported except 'Storage_Size for an access type.

LRM Chapter 14.

Full file I/O operations are supported and interface to AOS/VS operations. Text_Io and Low_Level_Io are supported.

APPENDIX C

TEST PARAMETERS

Certain tests in the ACVC make use of implementation-dependent values, such as the maximum length of an input line and invalid file names. A test that makes use of such values is identified by the extension .TST in its file name. Actual values to be substituted are represented by names that begin with a dollar sign. A value must be substituted for each of these names before the test is run. The values used for this validation are given below.

Name and Meaning	Value
$ACC_SIZE An integer literal whose value is the number of bits sufficient to hold any value of an access type.	32
$BIG_ID1 An identifier the size of the maximum input line length which is identical to $BIG_ID2 except for the last character.	(1..119 => 'A', 120 => '1')
$BIG_ID2 An identifier the size of the maximum input line length which is identical to $BIG_ID1 except for the last character.	(1..119 => 'A', 120 => '2')
$BIG_ID3 An identifier the size of the maximum input line length which is identical to $BIG_ID4 except for a character near the middle.	(1..80 => 'A', 81 => '3', 82..120 => 'A')

TEST PARAMETERS

Name and Meaning	Value
$BIG_ID4 An identifier the size of the maximum input line length which is identical to $BIG_ID3 except for a character near the middle.	(1..80 => 'A', 81 => '4', 82..120 => 'A')
$BIG_INT_LIT An integer literal of value 298 with enough leading zeroes so that it is the size of the maximum line length.	(1..117 => '0', 118..120 => "298")
$BIG_REAL_LIT A universal real literal of value 690.0 with enough leading zeroes to be the size of the maximum line length.	(1..115 => '0', 116..120 => "690.0")
$BIG_STRING1 A string literal which when catenated with $BIG_STRING2 yields the image of $BIG_ID1.	(1 => '"', 2..61 => 'A', 62 => '"')
$BIG_STRING2 A string literal which when catenated to the end of $BIG_STRING1 yields the image of $BIG_ID1.	(1 => '"', 2..60 => 'A', 61 => '1', 62 => '"')
$BLANKS A sequence of blanks twenty characters less than the size of the maximum line length.	(1..100 => ' ')
$COUNT_LAST A universal integer literal whose value is TEXT_IO.COUNT'LAST.	2147483647
$DEFAULT_MEM_SIZE An integer literal whose value is SYSTEM.MEMORY_SIZE.	16#10000000#
$DEFAULT_STOR_UNIT An integer literal whose value is SYSTEM.STORAGE_UNIT.	16

Name and Meaning	Value
$DEFAULT_SYS_NAME The value of the constant SYSTEM.SYSTEM_NAME.	HAWK
$DELTA_DOC A real literal whose value is SYSTEM.FINE_DELTA.	2.0**-31
$FIELD_LAST A universal integer literal whose value is TEXT_IO.FIELD'LAST.	127
$FIXED_NAME The name of a predefined fixed-point type other than DURATION.	NO_SUCH_TYPE
$FLOAT_NAME The name of a predefined floating-point type other than FLOAT, SHORT_FLOAT, or LONG_FLOAT.	NO_SUCH_TYPE
$GREATER_THAN_DURATION A universal real literal that lies between DURATION'BASE'LAST and DURATION'LAST or any value in the range of DURATION.	90000.0
$GREATER_THAN_DURATION_BASE_LAST A universal real literal that is greater than DURATION'BASE'LAST.	131073.0
$HIGH_PRIORITY An integer literal whose value is the upper bound of the range for the subtype SYSTEM.PRIORITY.	200
$ILLEGAL_EXTERNAL_FILE_NAME1 An external file name which contains invalid characters.	"BADCHAR@.!"
$ILLEGAL_EXTERNAL_FILE_NAME2 An external file name which is too long.	"THISFILENAMEWOULDBEPERFECTLYLEGALIF"
$INTEGER_FIRST A universal integer literal whose value is INTEGER'FIRST.	-2147483648

TEST PARAMETERS

Name and Meaning	Value
$INTEGER_LAST A universal integer literal whose value is INTEGER'LAST.	2147483647
$INTEGER_LAST_PLUS_1 A universal integer literal whose value is INTEGER'LAST + 1.	2147483648
$LESS_THAN_DURATION A universal real literal that lies between DURATION'BASE'FIRST and DURATION'FIRST or any value in the range of DURATION.	-90000.0
$LESS_THAN_DURATION_BASE_FIRST A universal real literal that is less than DURATION'BASE'FIRST.	-131073.0
$LOW_PRIORITY An integer literal whose value is the lower bound of the range for the subtype SYSTEM.PRIORITY.	1
$MANTISSA_DOC An integer literal whose value is SYSTEM.MAX_MANTISSA.	31
$MAX_DIGITS Maximum digits supported for floating-point types.	15
$MAX_IN_LEN Maximum input line length permitted by the implementation.	120
$MAX_INT A universal integer literal whose value is SYSTEM.MAX_INT.	2_147_483_647
$MAX_INT_PLUS_1 A universal integer literal whose value is SYSTEM.MAX_INT+1.	2_147_483_648
$MAX_LEN_INT_BASED_LITERAL A universal integer based literal whose value is 2#11# with enough leading zeroes in the mantissa to be $MAX_IN_LEN long.	(1..2 => "2:", 3..117 => '0', 118..120 => "11:")

Name and Meaning	Value
$MAX_LEN_REAL_BASED_LITERAL A universal real based literal whose value is 16:F.E: with enough leading zeroes in the mantissa to be $MAX_IN_LEN long.	(1..3 => 16:", 4..116 => '0', 117..120 => "F.E:")
$MAX_STRING_LITERAL A string literal of size $MAX_IN_LEN, including the quote characters.	(1 => '"', 2..119 => 'A', 120 => '"')
$MIN_INT A universal integer literal whose value is SYSTEM.MIN_INT.	-2_147_483_648
$MIN_TASK_SIZE An integer literal whose value is the number of bits required to hold a task object which has no entries, no declarations, and "NULL;" as the only statement in its body.	32
$NAME A name of a predefined numeric type other than FLOAT, INTEGER, SHORT_FLOAT, SHORT_INTEGER, LONG_FLOAT, or LONG_INTEGER.	HAWK
$NAME_LIST A list of enumeration literals in the type SYSTEM.NAME, separated by commas.	HAWK
$NEG_BASED_INT A based integer literal whose highest order nonzero bit falls in the sign bit position of the representation for SYSTEM.MAX_INT.	16#FFFFFFFE#
$NEW_MEM_SIZE An integer literal whose value is a permitted argument for pragma MEMORY_SIZE, other than $DEFAULT_MEM_SIZE. If there is no other value, then use $DEFAULT_MEM_SIZE.	16#10000000#

TEST PARAMETERS

Name and Meaning	Value
$NEW_STOR_UNIT An integer literal whose value is a permitted argument for pragma STORAGE_UNIT, other than $DEFAULT_STOR_UNIT. If there is no other permitted value, then use value of SYSTEM.STORAGE_UNIT.	16
$NEW_SYS_NAME A value of the type SYSTEM.NAME, other than $DEFAULT_SYS_NAME. If there is only one value of that type, then use that value.	HAWK
$TASK_SIZE An integer literal whose value is the number of bits required to hold a task object which has a single entry with one 'IN OUT' parameter.	32
$TICK A real literal whose value is SYSTEM.TICK.	.001

APPENDIX D

WITHDRAWN TESTS

Some tests are withdrawn from the ACVC because they do not conform to the Ada Standard. The following 44 tests had been withdrawn at the time of validation testing for the reasons indicated. A reference of the form AI-ddddd is to an Ada Commentary.

a. E28005C: This test expects that the string "-- TOP OF PAGE. --63" of line 204 will appear at the top of the listing page due to a pragma PAGE in line 203; but line 203 contains text that follows the pragma, and it is this text that must appear at the top of the page.

b. A39005G: This test unreasonably expects a component clause to pack an array component into a minimum size (line 30).

c. B97102E: This test contains an unintended illegality: a select statement contains a null statement at the place of a selective wait alternative (line 31).

d. C97116A: This test contains race conditions, and it assumes that guards are evaluated indivisibly. A conforming implementation may use interleaved execution in such a way that the evaluation of the guards at lines 50 & 54 and the execution of task CHANGING_OF_THE_GUARD results in a call to REPORT.FAILED at one of lines 52 or 56.

e. BC3009B: This test wrongly expects that circular instantiations will be detected in several compilation units even though none of the units is illegal with respect to the units it depends on; by AI-00256, the illegality need not be detected until execution is attempted (line 95).

f. CD2A62D: This test wrongly requires that an array object's size be no greater than 10 although its subtype's size was specified to be 40 (line 137).

g. CD2A63A..D, CD2A66A..D, CD2A73A..D, and CD2A76A..D (16 tests): These tests wrongly attempt to check the size of objects of a derived type (for which a 'SIZE length clause is given) by passing them to a derived subprogram (which implicitly converts them to the parent type (Ada standard 3.4:14)). Additionally, they use the 'SIZE length clause and attribute, whose interpretation is considered problematic by the WG9 ARG.

h. CD2A81G, CD2A83G, CD2A84M..N, and CD50110 (5 tests): These tests assume that dependent tasks will terminate while the main program executes a loop that simply tests for task termination; this is not the case, and the main program may loop indefinitely (lines 74, 85, 86, 96, and 58, respectively).

i. CD2B15C and CD7205C: These tests expect that a 'STORAGE_SIZE length clause provides precise control over the number of designated objects in a collection; the Ada standard 13.2:15 allows that such control must not be expected.

j. CD2D11B: This test gives a SMALL representation clause for a derived fixed-point type (at line 30) that defines a set of model numbers that are not necessarily represented in the parent type; by Commentary AI-00099, all model numbers of a derived fixed-point type must be representable values of the parent type.

k. CD5007B: This test wrongly expects an implicitly declared subprogram to be at the address that is specified for an unrelated subprogram (line 303).

l. ED7004B, ED7005C..D, and ED7006C..D (5 tests): These tests check various aspects of the use of the three SYSTEM pragmas; the AVO withdraws these tests as being inappropriate for validation.

m. CD7105A: This test requires that successive calls to CALENDAR.CLOCK change by at least SYSTEM.TICK; however, by Commentary AI-00201, it is only the expected frequency of change that must be at least SYSTEM.TICK--particular instances of change may be less (line 29).

n. CD7203B and CD7204B: These tests use the 'SIZE length clause and attribute, whose interpretation is considered problematic by the WG9 ARG.

o. CD7205D: This test checks an invalid test objective: it treats the specification of storage to be reserved for a task's activation as though it were like the specification of storage for a collection.

p. CE2107I: This test requires that objects of two similar scalar types be distinguished when read from a file--DATA_ERROR is expected to be raised by an attempt to read one object as of the other type. However, it is not clear exactly how the Ada standard 14.2.4:4 is to be interpreted; thus, this test objective is not considered valid (line 90).

q. CE3111C: This test requires certain behavior, when two files are associated with the same external file, that is not required by the Ada standard.

r. CE3301A: This test contains several calls to END_OF_LINE and END_OF_PAGE that have no parameter: these calls were intended to specify a file, not to refer to STANDARD_INPUT (lines 103, 107, 118, 132, and 136).

s. CE3411B: This test requires that a text file's column number be set to COUNT'LAST in order to check that LAYOUT_ERROR is raised by a subsequent PUT operation. But the former operation will generally raise an exception due to a lack of available disk space, and the test would thus encumber validation testing.

APPENDIX E

COMPILER OPTIONS AS SUPPLIED BY TLD SYSTEMS, LTD.

Compiler: TLD MV/MV Ada Compiler System, Version 2.1.3

ACVC Version: 1.10

In all of the above examples, the input file test.ada is compiled generating a relocatable object file named test.obj, a listing file named test.lst containing a summary of the option switches, a source image and generated assembly listing and a cross reference listing. The Ada source code is interspersed with the generated assembly code in the listing file. No constraint checking code is generated. All address computations are performed in 1750A single precision fixed point arithmetic. A system cross reference file, test.srf is also generated.

3.2 Compiler Recognized Names

3.3 Compiler Option Switches

Compiler option switches provide control over various processing and output features of the compiler. These features include several varieties of listing output, the level and kinds of optimizations desired, the choice of target computer, and the operation of the compiler in a syntax checking mode only.

Keywords are used for selecting various compiler options. The complement keyword, if it exists, is used to disable a compiler option and is formed by prefixing the switch keyword with "no_".

Switches may be abbreviated to the number of characters required to uniquely identify the switch. For example, the switch "elaborator" (explained in the list, below) may be uniquely identified by the abbreviation "el." Of course, the entire name may be used. If an option is not specified by the user, a default setting is assumed. All specified compiler options apply to a single invocation of the compiler.

The default setting of a switch and its meaning are defined in the table below. The meaning of the complement form can be derived by complementing the meaning of the switch. For some switches, the complement meaning is not obvious; these complement switch keywords are listed separately.

In the description of the switches, the target dependent name <target> is used. The value of this symbol is determined by the value of the target switch.

Compiler generated file specifications generally conform to host conventions. For example:

The generated file name is the source filename appended with the default file suffix. If the user specifies an output file name, no default suffix is provided.

Switch Name	Meaning

16badar
32badar -- default

The 32BADDR option causes address computations to be performed using 1750A double precision fixed point data words. If 16BADDR is selected, address computations will be performed using single precision fixed point data words ignoring the possibility of a 1750A Fixed Point Overflow Interrupt due to computation of an address greater than 7FFF hex. Applicable to 1750A target only.

checks -- default
checks[=check_identifier]
checks[=check_identifier[,...]]
no_checks
no_checks[=check_identifier]
no_checks[=check_identifier[,...]]

The checks

switch without check_identifiers enables all run time checks. If one or more check_identifiers are specified, the specified run time checks are enabled; the status of run time checks associated with unmentioned check_identifiers is unchanged.

The no_checks switch omits all run time checks. If one or more check_identifiers are specified, the specified run time checks are omitted; the status of run time checks associated with unmentioned check_identifiers is unchanged. With one exception, no_checks pragma Suppress(all_checks) in the source code. The exception is associated with the TLD defined check_identifier exception_info.

Check_identifiers are listed below and are described in the LRM, Section 11.7 except exception_info.

access_check	discriminant_check	division_check
elaboration_check	exception_info	index_check
length_check	overflow_check	range_check
storage_check		

The TLD defined check_identifier exception_info is explained below.

TLDada generates a string in the relocatable object code that is the full path name of the file being compiled. TLDada also generates extra instructions in the relocatable code that are used by the Run Time System to inform the programmer where an unhandled exception is raised. The no_checks=exception_info switch will suppress both the string and extra instructions, whereas the pragma will only suppress the extra instructions.

codegen -- default
no_codegen

The no_codegen switch causes the compiler to check syntax and update the Ada Program Library, but no code is generated.

cpl=n
cpl=110 -- default

The cpl switch specifies the number of characters per line in the listing file. The cpl value can range from 80 to 132.

crossref
no_crossref -- default

The crossref switch generates a cross-reference listing which includes referenced names only. The cross-reference listing is included in the listing file; therefore the list switch must be selected or crossref has no effect.

cseg -- default
no_cseg

The cseg switch requests that constants be allocated in a control section of their own (1750A target only).

debug -- default
no_debug

The debug switch selects the production of symbolic debug tables in the relocatable object file that permit access to Ada source program names, attributes, and source line numbers at run time.
Alternate abbreviation: dbg, no_dbg

delassign -- default
no_delassign

The delassign switch optimizes code by deleting redundant assignments. Note: Use of this switch can cause erroneous source programs to execute with unexpected results if references to access objects are made without regard to the interference semantics of Ada.

elaborator

The elaborator switch informs TLDada that the specified source-file-spec is the name of the Ada Program Library unit that is to be used as the main subprogram.

errlevel=n
errlevel=3 -- default

The errlevel switch assigns a minimum error level value which will terminate compilation at the completion of the compiler phase encountering an error equal to or greater than the indicated level. The value can range from 0 to 3.

gopt -- default
gopt(optswitch)
gopt(optswitch(,...))
no_gopt -- temporarily disabled

The gopt switch cannot be disabled in the currently released Ada Compiler. i The gopt switch enables global optimization and selects which optimizations are to be performed by the global optimizer. Section 3.8 of the Ada Compiler Reference Manual provides further information on optimization. Selection of the gopt switch enables the following default optswitch options as indicated unless overridden by an explicit optswitch selection.

Optswitch Name	Meaning
cse -- default no_cse	Common subexpression elimination.
fold -- default no_fold	Folding of constants, scalars, and expressions.
adel -- default no_adel	

Dead assignment deletion.

hoist -- default
no_hoist
Code hoisting.

icm -- default
no_icm
Invariant code motion out of loops.

strad -- default
no_strad
Strength reduction.

trep -- default
no_trep
Test replacement.

rgal -- default
no_rgal
Register allocation.

extc
no_extc -- default
External calls may exit with abort.

safe -- default
no_safe
Code hoisting and invariant code motion are performed only if no new computations are executed.

indent=n
indent=3 -- default
no_indent

The indent switch produces a formatted (indented) source listing. This switch assigns a value to the number of columns used in indentation; the value n can range from 0 to 15.

info -- default
no_info

The info switch outputs all diagnostic messages regardless of level. The no_info switch suppresses the output of information-level diagnostic messages.

intsl
no_intsl -- default

The intsl switch intersperses lines of source code with the assembly code it generates in the macro listing. This switch is valid only if the list, source and macro switches are selected.

library Ada-program-library-file-spec
library <target>.lib -- default

The library switch specifies the file to be used for Ada Program Library. The default value of <target> in the Ada Program Library file spec is derived from the target switch.

list(=listing-file-spec)
no_list -- default

The LIST switch generates a listing file. The default file suffix is lis. The listing-file-spec can be optionally specified. The listing will be directed to the user's terminal if the listing-file-spec is /tty.

listcopy
no_listcopy -- default

The listcopy switch lists the source lines of files included via !copy directives.
Alternate abbreviations: lc, no_lc

log
no_log -- default

The log switch causes the Compiler to write to stdout the source file spec of the file being compiled.

lpp=n
lpp=60 -- default

The lpp switch assigns a value to the number of lines per page for listing. The value can range from 10 to 99.
ADE Related Switch: /lpp

macro
no_macro -- default

The macro switch produces an assembly like object code listing appended to the source listing file. The list switch must be enabled or this switch has no effect.
ADE Related Switch: /ASSEMBLY

maint
no_maint -- default

The maint switch is used only for compiler maintenance and debugging.

makelib(=parent-APL-spec)
no_makelib=default_RTS_spec -- default

The makelib switch creates a new Ada Program Library (APL) file. This switch should be used with caution because it creates a new APL file in the default directory even if another APL file of the same name existed.

The new APL file is created in the current working directory with the name <target>.lib unless the library switch is used.

If makelib is used without a parent, a new library is created with the default RTS specification. This specification is derived from the name tld_lib_<target>. See the target dependent compiler sections for further explanations of this name.

maxerrors=n
maxerrors=500 -- default

The maxerrors switch assigns a value limit to the number of errors forcing job termination. Once this value is exceeded, the compilation is terminated. Information-level diagnostic messages are not included in the count of errors forcing termination. The specified value's range is from 0 to 500.

model=model
model=standard -- default
1750A target

TLDada produces code for any implementation that conforms to MIL-STD-1750A. The model switch informs TLDada that a special model of the MIL-STD-1750A is the target computer. MODEL also is used to inform the compiler of 1750A implementations with special Built-In-Functions (BIFs). Models and the special features that characterize them are listed below.

mdc281

This switch allows the compiler to make use of the standard mdc281 BIF that produces a 64-bit integer multiply result. In addition, the mdc281 chip set has a known bug associated with FNEG and FABS in a boundary condition. Use of this switch results in generated code that avoids the problem, although the generated code is less efficient.

standard

All other implementations of MIL-STD-1750A are supported by the default value of the model switch.

object(object-file-spec)
object -- default
no_object

The object switch produces a relocatable object file. The default file suffix is ".obj".

opt -- default
no_opt

The opt switch enables regional optimization on the compiled code.

parm
no_parm -- default

The parm switch causes all option switches governing the compilation, including the defaulted option switches, to be included in the listing file. The list option must also be selected or parm will have no effect. User specified switches are preceded in the listing file by a leading asterisk (*).

pcross
no_pcross -- default

The pcross switch selects a procedure all cross reference listing.

phase -- default
no_phase

The no_phase switch suppresses displaying phase times during compilation.

reformat(reformat-file-spec)
no_reformat -- default

The reformat switch causes TLDada to reformat the source listing in the listing file and, if a reformat-file-spec is present, to generate a reformatted source file. The default suffix of the new source file is ".rfm."

skip [(letter...)]
no_skip -- default

The skip switch permits the selective skipping of source code enclosed within !begin-!end directives. This option functions as if a !skip directive for each of the corresponding letter(s) had occurred at the beginning of the source program and if no letter is specified, exactly as if a !skip directive without any letter had occurred as the start of the source program, i.e., all !begin-!end enclosed source will be skipped. This option permits conditional compilation without changing the source file.

source -- default
no_source

The source switch causes the input source program to be included in the listing file. Diagnostic messages, unless otherwise suppressed, are always included in the listing file.

sti (=sti-file-spec)
no_sti -- default

The sti switch generates a software tools interface file. The sti-file-spec can be completely or partially specified. If only the sti file name is specified, the default sti file type, ".sti", is used to form the sti-file-spec. If only the file type is specified, the file name of the input-file-spec is used to form the sti-file-spec. If no sti-file-spec is specified, the sti file name is formed from the file name of the input-file-spec and the default sti file type, ".sti".

syntax_only
no_syntax only -- default

The syntax_only switch performs syntax checking on the source program; no object file is produced and the macro switch is ignored. The Ada Program Library is not updated.

sysref[srf-file-spec]
no_sysref -- default

The sysref switch generates an external name cross-reference file. This file consists of all external names referenced in the source program with the modules which refer to that external name. The default file suffix is SRF.

table_picture
no_table_picture -- default

This switch selects a listing containing a graphical representation of the layout of table-items within table entries declared in the program.
Alternate abreviation: tpic.

target 1750A -- default
target HAWK
target 68020
target HP300
target=MV

The target switch selects the target computer for which code is to be generated for this compilation. "1750A" selects the MIL-STD-1750A Instruction Set Architecture, Notice A. "HAWK" selects the Rolm HAWK architecture running under either AOS/VS or ARTS/32. "68020" selects the Motorola 68020 architecture. "MV" selects the Eclipse MV architecture operating under AOS/VS. "HP300" selects the HP 9000 Series 300 Series architecture operating under HPUX. The 1750A is the only target currently released.